beam is equal to the normal power, the measurable distance to an object is equal to normal one. Only in the presence of an object spaced from the subject vehicle by equal to or shorter than the current measurable distance, the comparator 35 outputs a high-level decision signal representing the reception of an echo.

A step 160 following the step 150 derives the measured time interval from the output signal of the time measurement circuit 50. The step 160 calculates the distance to the detected object from the subject vehicle on the basis of the measured time interval and the velocity of light. After the step 160, the current execution cycle of the program segment ends.

The step 120 in Fig. 3 provides a preliminary emission of the laser light. The step 150 in Fig. 3 provides a main emission of the laser light which is executed after the preliminary emission thereof. A set of a preliminary emission of the laser light and a main emission thereof is executed for each of the directions (the angular directions) D1-DN of the transmission of the forward pulse laser beam which form the detection area. Thus, a set of a preliminary emission of the laser light and a main emission thereof is repetitively executed a plurality of times during every cycle or period of the motor drive signal outputted from the microcomputer 90 to the motor drive circuit 18, that is, during every period of the scanning of the detection area by the forward pulse laser beam.

As shown in Fig. 4, the power of the laser light generated by preliminary emissions remains equal to a prescribed low level. The power of the laser light generated by a main emission is changed

between the low level and a normal level (higher than the normal level) depending on whether or not an object is detected as a result of the immediately-preceding preliminary emission. Specifically, the power of the laser light generated by a main emission is equal to the low level in the case where an object is detected as a result of the immediately-preceding preliminary emission. On the other hand, the power of the laser light generated by a main emission is equal to the normal level in the case where an object is not detected as a result of the immediately-preceding preliminary emission.

The forward pulse laser beam having a lower power less adversely affects human eyes. Since a set of a preliminary emission of the laser light and a main emission thereof is executed for each of the directions (the angular directions) D1-DN of the transmission of the forward pulse laser beam which form the detection area, the timing difference between the preliminary emission and the main emission in the set is relatively small. The small timing difference results in a good response characteristic of the apparatus of Fig. 1. In other words, the power of the forward pulse laser beam can be changed between a low level and a normal level (that is, the measurable distance can be changed between a short value and a normal value) in such a way as to provide a good response characteristic of the apparatus of Fig. 1.

The steps 110 and 120 in Fig. 3 correspond to a second driving means. The steps 130 and 140 in Fig. 3 correspond to an obstacle judging means. The step 150 in Fig. 3 corresponds to a first driving means. The step 160 in Fig. 3 and the time

measurement circuit 50 in Fig. 1 correspond to a first calculating means.

It should be noted that the laser light may be replaced by other electromagnetic wave such as radio wave or millimeter wave.

Second Embodiment

A second embodiment of this invention is similar to the first embodiment thereof except for a design change mentioned hereafter. According to the second embodiment of this invention, the step 130 determines whether or not the comparator 35 outputs a high-level decision signal during a time interval corresponding to the low-power measurable distance. In the case where the comparator 35 outputs a high-level decision signal, that is, in the case where an object is detected, the program exists from the step 130 and then the current execution cycle of the program segment ends. Thus, in this case, a main emission of the laser light is inhibited. On the other hand, in the case where the comparator 35 does not output a high-level decision signal, that is, in the case where an object is not detected, the program advances from the step 130 to the step 140. The step 140 is successively followed by the steps 150 and 160. After the step 160, the current execution cycle of the program segment ends.

Preferably, the microcomputer 90 operates to notify the detection of an object at the step 130 to an occupant of the subject vehicle as a signal of warning of a collision. Preferably, in this case, the microcomputer 90 activates a braking system of the subject vehicle to reduce the speed thereof.